CPM PROS INC.

Long-Lead Equipment Risk Reference

Hyperscale Data Center Programs | Q1–Q2 2026

On hyperscale data center programs, the Ready-for-Service date is not determined by structural steel or MEP rough-in. It is determined by the procurement decisions made — or deferred — in the first ninety days of the project. This reference identifies the equipment categories most likely to slip a schedule, ranks them by combined risk exposure, and documents the planning errors that convert long lead times into missed energization dates.

TIER 1	RFS-Critical | 52–128+ week lead times
TIER 2	High Risk | 40–80 week lead times
TIER 3	Elevated Risk | 20–52 week lead times

Equipment Risk Summary Table

Lead times shown are current market estimates as of Q1–Q2 2026. Ranges reflect variation by manufacturer, geography, voltage class, and custom specification requirements. **All lead times should be confirmed against vendor-specific manufacturing slot availability at time of submittal, not catalog estimates.**

Equipment Category	Tier	Lead Time (Q1-Q2 2026)	Demand Pressure	RFS Schedule Risk	Most Common Planning Error
Large Power Transformers (50 MVA+, utility-interconnect)	1	80–128 wks (up to 3–5 yrs for custom)	Critical	Direct — blocks energization	Vendor catalog used instead of confirmed mfg slot
Medium Voltage Switchgear (metal-clad, 5–38 kV class)	1	44–65 wks (elevated, trending down slightly)	High	Direct — upstream of all LV distribution	Generic 52-wk assumption; no AHJ approval buffer
Diesel Generators (2 MW+ paralleled sets)	1	52–80 wks (engine block allocations tight)	High	Direct — RFS requires backup power commissioned	Single-source spec; no alternate engine path identified

Equipment Category	Tier	Lead Time (Q1-Q2 2026)	Demand Pressure	RFS Schedule Risk	Most Common Planning Error
UPS Systems (large-frame modular, 500 kVA–2 MVA+)	2	40–72 wks (module allocation limited)	High	High — required prior to IT load cutover	Frame ordered; modules assumed available; modules are separate long-lead items
Utility Substation Equipment (CBs, CT/PT, metering, protective relays)	2	40–78 wks (utility-driven; autility queue separate)	High	High — utility interconnect drives RFS date directly	Utility interconnect schedule treated as fixed; it is not
Chillers (centrifugal / screw, >500 ton)	2	40–60 wks (compressor allocations limited)	Moderate–High	High — commissioning requires cooling operational	Chiller delivery assumed tied to steel; it is not
Bus Duct / Busway (1,000A–6,000A plug-in or feeder runs)	2	30–52 wks (custom fabrication; length-dependent)	Moderate–High	Moderate-High — coordinates with transformer & LV gear placement	Treated as commodity; custom runs require early dimensioned drawings
Cooling Distribution Units (CDU, liquid-to-liquid, >300 kW)	3	26–52 wks (supply chain pressure growing with AI density)	Rapidly increasing	High for AI-density builds — GPU loads require CDU before IT energization	CDU treated as late-stage IT item; it is MEP critical path on AI campuses
Dry-Type Distribution Transformers (500 kVA–2,500 kVA)	3	24–40 wks (improving but still constrained)	Moderate	Moderate — quantity per floor means one late unit delays a full data hall	Assumed available off shelf; pad-mount and dry-type are not the same market
Automatic Transfer Switches (ATS/BTSS, >2,000A frame)	3	20–36 wks (frame size dependent)	Moderate	Moderate — failure to source blocks generator integration testing	ATS often procured last; integrated commissioning requires it first

Sources: Wood Mackenzie T&D Supply Chain Q2 2025 report; Turner & Townsend 2025–2026 Datacenter Construction Cost Index; Wesco Data Center Development Guide 2025; Orrick Megawatts to Megabytes 2025; market analysis from multiple procurement advisories. Lead times represent current procurement estimates and are subject to change without notice.

Equipment Category Analysis

TIER 1 | RFS-Critical

Large Power Transformers (50 MVA+, utility-interconnect class)

Lead Time	Demand Pressure	RFS Risk
80–128 weeks average (up to 3–5 years for custom high-voltage units)	Critical — driven by AI buildout, grid modernization, EV, and renewables simultaneously	Direct. No transformer delivery = no utility interconnect = no energization

Large power transformers are the single highest-risk procurement item on any hyperscale campus today. Wood Mackenzie's Q2 2025 T&D Supply Chain report pegged the average lead time at 128 weeks — a figure that had eased 10 weeks from the prior quarter, but remains more than double the historical norm. For custom high-voltage units above 100 MVA, lead times of 3–5 years are not uncommon, driven by constrained grain-oriented electrical steel (GOES) supply, a global manufacturing base concentrated in fewer than six major producers, and simultaneous demand spikes from renewable generation integration, grid hardening, and electrification programs competing with hyperscale for the same manufacturing slots.

A typical 50 MW AI data center campus requires 4–6 large power transformers for utility interconnect and primary distribution — each a custom specification, built to order. The procurement window for these units must open within the first 60 days of project initiation, not after design development drawings are approved. By the time a transformer submittal is formally issued under a traditional procurement sequence, the project may already be 6–9 months into a lead time it didn't know it had started.

COMMON PLANNING ERRORS

- Using vendor catalog lead times rather than calling for a confirmed manufacturing slot — catalog figures are marketing estimates, not production commitments.
- Treating the utility interconnect agreement date as the transformer delivery constraint, when in practice transformer availability constrains both the delivery and the utility interconnect sequence.
- Specifying a single manufacturer without an approved alternate, then losing the manufacturing slot when the project scope or voltage class changes mid-design.
- Scheduling factory acceptance testing (FAT) in the same month as planned delivery — FAT requires a separate slot allocation and adds 4–8 weeks.

SCHEDULER'S NOTE

Float assigned to large transformer delivery should be treated as zero regardless of what the P6 schedule shows. If the transformer is on the critical path, recovery options after week 60 are effectively limited to re-sequencing downstream activities around a delayed energization — not accelerating the transformer itself. Procurement lead time verification against the vendor's current order backlog is a required input to any credible baseline schedule on a hyperscale program.

TIER 1 | RFS-Critical

Medium Voltage Switchgear (metal-clad, 5–38 kV class)

Lead Time	Demand Pressure	RFS Risk
44–65 weeks average (eased slightly Q2 2025; still well above norm)	High — MV distribution now extends inside the building on hyperscale campuses as IT loads grow	Direct. MV gear is upstream of every LV distribution path. Late = nothing downstream runs

Medium voltage switchgear lead times averaged 44 weeks per Wood Mackenzie's Q2 2025 data — a slight improvement from the prior peak, but still nearly three times the pre-2022 norm. The constraint is concentrated in specific product lines: metal-clad switchgear above 15 kV, arc-flash-rated and SF6-free configurations (increasingly required by specification), and custom bus arrangements driven by redundancy topology. On hyperscale campuses with internal MV distribution rings, the quantity of switchgear required has grown substantially, multiplying the procurement exposure.

The schedule risk from MV switchgear is compounded by its position in the construction sequence: the gear must be set and energized before transformers downstream of it can be tested, before generators can be synchronized, and before any UPS or LV distribution equipment can be commissioned under load. A submittal issued at month four of a 22-month program with a 52-week manufacturing lead time lands the planned delivery at week 70 — assuming a 10-day AHJ review assumption holds. When the AHJ review actually takes six weeks, delivery slips to week 74. Four weeks of procurement slip cascades 6–8 weeks into the commissioning sequence due to the sequential nature of high-voltage energization, authority having jurisdiction witness testing, and utility interconnect coordination.

COMMON PLANNING ERRORS

- Applying a standard 52-week lead time assumption without accounting for the AHJ submittal and approval period, which can add 4–12 weeks depending on the jurisdiction.
- Specifying SF6-insulated switchgear in jurisdictions or programs where SF6-free is now required, triggering late redesign and a complete restart of the submittal process.
- Treating MV switchgear as a single line item in the procurement log when the campus requires multiple lineups across several electrical rooms — each with its own submittal, approval, and delivery sequence.

SCHEDULER'S NOTE

In P6 scheduling, MV switchgear delivery should drive the predecessor logic for the entire high-voltage energization train: transformer testing, generator synchronization, and UPS system commissioning. If that predecessor relationship is not modeled, the schedule will show false float in those downstream activities and mask the true RFS exposure until it is too late to recover.

TIER 1 | RFS-Critical

Diesel Generators (2 MW+ paralleled sets)

Lead Time	Demand Pressure	RFS Risk
52–80 weeks (engine block allocations are the binding constraint; packager lead time is secondary)	High — AI campus power densities require larger genset lineups; multiple units per campus	Direct. Backup power must be commissioned and load-tested before any Tier III/IV certification or IT cutover

Generator lead times in the 52–80 week range are being driven by engine block allocation constraints at the major manufacturers — Caterpillar, Cummins, and MTU/Rolls-Royce — who are managing production slots for engine blocks across multiple end markets including marine, standby power, and prime power simultaneously. The packager who assembles the final generator set (fuel systems, radiator, controls, enclosure) is often quoting shorter lead times than are real because their quote assumes engine block availability that has not been confirmed. The critical question is not the packager's lead time — it is whether the engine block has a confirmed slot in the manufacturer's build schedule.

For hyperscale campuses requiring N+1 or 2N generator redundancy across 10–20 MW of critical load, the total number of generator sets — often 8 to 20 units per campus — means that even staggered deliveries create a long commissioning tail. Integrated systems testing under load requires all generators to be present, synchronized, and tested before the utility interconnect can be declared ready.

COMMON PLANNING ERRORS

- Booking the packager's quoted lead time without calling the engine manufacturer to confirm block availability — these are frequently different numbers by 8–16 weeks.
- Treating generator commissioning as a single activity in P6 when it consists of multiple sequential tests: individual load bank testing, parallel synchronization testing, ATS integration testing, and utility transfer testing — each with its own duration and hold point.
- Specifying an enclosure configuration (sound-attenuated, extreme cold weather) that adds 8–12 weeks to packager lead time without reflecting this in the schedule.

SCHEDULER'S NOTE

Generator commissioning is a common place where schedulers compress duration to meet a target date. On hyperscale programs, integrated load bank testing alone requires 2–4 weeks per switchgear lineup, and that testing cannot be compressed without violating commissioning protocols. If the generator delivery date is moving, the RFS date is moving with it — the schedule should show that relationship explicitly so the owner can make procurement acceleration decisions with clear cost-schedule tradeoffs.

TIER 2 | High Risk

UPS Systems (large-frame modular, 500 kVA–2 MVA+)

Lead Time	Demand Pressure	RFS Risk
40–72 weeks (frame may ship faster; module allocation is the binding constraint)	High — AI campuses require more UPS capacity per MW and demand faster critical transfer times	High. IT load cutover cannot occur without UPS commissioned and battery runtime verified

Large-frame modular UPS systems from Eaton, Vertiv, Schneider, and ABB are constrained by power module availability, not necessarily frame lead time. A project that orders the UPS frame will often receive delivery confirmation from the manufacturer before learning that the power modules — which are ordered separately, sometimes from a different production facility — are 12–16 weeks behind the frame. The schedule consequence is a UPS frame that sits on the floor with no commissioning path because the modules haven't arrived.

Battery systems (VRLA or lithium-ion cabinets) associated with the UPS have their own lead time exposure, particularly as lithium chemistry has become the default specification. The battery procurement must be tracked independently of the UPS frame and modules, and runtime testing requires all three components to be present and connected simultaneously.

COMMON PLANNING ERRORS

- Entering a single UPS delivery date in the procurement log without tracking frame, modules, and batteries as separate line items with independent lead times.
- Failing to account for the N+1 redundancy configuration requiring an additional module allocation that may be on a different production run from the base units.
- Not identifying the data center's bypass requirement and whether a static bypass switch or maintenance bypass panel has its own separate lead time.

SCHEDULER'S NOTE

UPS commissioning logic in P6 should show three predecessors: frame delivery, module delivery, and battery delivery — with a commissioning activity that cannot start until all three are satisfied. The single-line 'UPS delivery' activity in many schedules hides the split delivery risk until it's on the floor.

TIER 2 | High Risk

Chillers (centrifugal / screw, 500+ ton)

Lead Time	Demand Pressure	RFS Risk
40–60 weeks (compressor allocations are the constraint; varies by refrigerant spec)	Moderate–High — AI density drives chiller capacity increases per campus; HFC phase-out complicates spec	High. Full-facility cooling commissioning requires operational chillers; commissioning cannot proceed without them

Centrifugal and screw chillers above 500 tons are subject to compressor allocation constraints at Carrier, Trane, York, and Daikin. The current HFC refrigerant transition (R-410A phase-down, R-454B and R-1234ze conversions) has added complexity to chiller specifications: projects that specify a refrigerant type that is being phased out, or that specify a new-generation refrigerant before the manufacturer has full production capacity for that chemistry, face extended lead times or forced substitution late in the design process.

The cooling commissioning sequence on a hyperscale campus typically requires chillers to be operational before the facility cooling infrastructure can be balanced, before CDUs can be charged and tested, and before any IT load can be brought up to operating temperature. A chiller delivery that slips 8 weeks compresses the entire pre-RFS commissioning window.

COMMON PLANNING ERRORS

- Specifying a refrigerant type without confirming manufacturer production availability for that refrigerant at the required tonnage — this is a current active risk given refrigerant transitions.
- Linking chiller delivery to structural roof completion rather than to the actual critical path for cooling commissioning, which often has an earlier required-on-site date.
- Treating cooling tower and condenser water piping as parallel activities when they must be complete before chiller testing can begin.

SCHEDULER'S NOTE

Chiller commissioning requires facility chilled water piping to be flushed, treated, and balanced before the chiller can be started under load. In P6 scheduling, the chiller delivery date should be predecessored by piping completion, not the reverse. Many schedules invert this logic and show chiller delivery as a predecessor to piping — masking the true commissioning start date.

TIER 3 | Elevated Risk (Rapidly Increasing)

Cooling Distribution Units (CDU, liquid-to-liquid, 300 kW+)

Lead Time	Demand Pressure	RFS Risk
26–52 weeks (supply chain pressure increasing rapidly with AI GPU density demand; CDU market surged 156% YoY in 2025)	Rapidly increasing — GPU rack densities exceeding 100 kW make CDUs mandatory on AI campuses	High for AI builds. GPU infrastructure cannot energize without CDU operational; treat as MEP critical path, not IT item

Coolant distribution units have historically been treated as late-stage IT infrastructure items procured after facility mechanical systems are complete. On AI-density hyperscale campuses, this classification is no longer accurate. When rack power density exceeds 30–50 kW and GPU loads require direct-to-chip liquid cooling, the CDU is as much a mechanical infrastructure item as the chiller — it must be installed, piped, charged, and tested before a single GPU server can be powered up.

The CDU market surged 156% year-over-year in Q2 2025 according to Dell'Oro Group research, driven entirely by AI workload expansion. This growth is outpacing manufacturing capacity at established suppliers including Vertiv, CoolIT, and Boyd, and has attracted a wave of new entrants whose production quality and lead time reliability are unproven at hyperscale quantities. Specifying an untested CDU vendor to achieve a shorter quoted lead time is a common procurement error that trades schedule risk for product risk.

COMMON PLANNING ERRORS

- Classifying CDUs as IT procurement items rather than MEP items — this routes them through a different procurement track with a later start date and no connection to the mechanical commissioning schedule.
- Specifying a new-entrant CDU vendor based on a shorter quoted lead time without verifying production capacity for the required quantity.
- Failing to coordinate CDU secondary loop connections with the facility chilled water system in design — late interface conflicts add 4–8 weeks to the commissioning sequence.

SCHEDULER'S NOTE

On AI campus projects, the CDU should be in the P6 schedule as a mechanical item with a predecessor to the chilled water system and a successor to IT rack power-up activities. If it is tracked only in the IT procurement log with no CPM relationships, the energization date risk is invisible until commissioning begins.

Scheduler's Procurement Risk Checklist

The following actions apply to every long-lead equipment category at schedule baseline. Each unchecked item represents an unquantified float assumption that will become visible only when it is too late to recover.

Before Baseline Submission

- ■ Obtain vendor-confirmed manufacturing slot (not catalog lead time) for all Tier 1 and Tier 2 equipment.
- ■ Verify submitting contractor has an approved vendor list (AVL) acceptance for each manufacturer — AVL onboarding adds 4–12 weeks and is not tracked in most schedules.
- ■ Confirm AHJ submittal and approval durations for MV switchgear and generator installations based on jurisdiction history, not standard assumption.
- ■ Confirm that transformer specification matches the utility's service entrance requirements — discrepancies discovered post-submittal restart the lead time clock.
- ■ Verify that CDUs are classified as mechanical (MEP) procurement items, not IT, and are logic-linked to the chilled water commissioning sequence in P6.
- ■ Confirm generator engine block allocation separately from packager lead time quote.
- ■ Verify UPS frame, modules, and batteries are tracked as separate procurement line items with independent confirmed delivery dates.

At Each Monthly Schedule Update

- ■ Compare confirmed manufacturing slot dates against schedule delivery dates — flag any delta greater than 2 weeks as a schedule variance requiring written documentation.
- ■ Confirm no long-lead equipment submittals are pending AHJ review beyond their planned duration.
- ■ Verify that factory acceptance testing (FAT) travel and hold-point durations are reflected in the schedule for each Tier 1 item.
- ■ Confirm chilled water piping and CDU secondary loop design interfaces have been resolved and are not outstanding RFIs that could affect delivery acceptance.
- ■ Update float analysis for all Tier 1 equipment to reflect current confirmed delivery dates, not original baseline dates.

At 90% Design (Latest Opportunity for Course Correction)

- ■ If any Tier 1 equipment has a confirmed delivery date that is later than the schedule baseline date, prepare a written RFS exposure memo for the owner's review.
- ■ Confirm that generator integrated load bank testing durations have not been compressed from the commissioning plan without the commissioning authority's written acceptance.

- Verify that the utility interconnect inspection and energization sequence is reflected in the schedule with the correct utility-owned duration — this duration is not within the contractor's control.
- Confirm that no equipment delivery dates depend on a single point of contact at the manufacturer — succession plans for vendor management contacts should be documented.

About This Reference Paper

This reference paper was prepared by CPM Pros Inc. as a practitioner resource for construction program managers, owner's representatives, and capital program directors managing hyperscale data center delivery. It is intended to support schedule baseline reviews, procurement risk assessments, and schedule update meetings — not to replace vendor-specific lead time confirmation or legal procurement advice.

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If your program is entering baseline development or currently in schedule recovery, CPM Pros offers an independent schedule peer review focused specifically on procurement sequencing, float integrity, and RFS date exposure. Reviews are delivered as a written report within 10 business days.

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To request an independent schedule peer review or discuss a specific procurement risk on your current program, visit cpmpros.com.

Data sources: Wood Mackenzie T&D Supply Chain Report Q2 2025; Turner & Townsend 2025–2026 Datacenter Construction Cost Index (300+ projects, 20+ countries); Wesco Data Center Development Guide 2025; Dell'Oro Group Data Center Liquid Cooling Market Research Q3 2025; Orrick LLP Megawatts to Megabytes 2025; Energy News Beat electrical equipment shortage analysis; market analysis from multiple industry procurement advisories. Lead times are market estimates current as of Q1–Q2 2026 and are subject to change. CPM Pros Inc. makes no warranty regarding the accuracy of specific lead time figures; all equipment procurement timelines should be confirmed directly with manufacturers.